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INVESTMENT CONSIDERATIONS IN THE FRUIT AND VEGETABLE PROCESSING SECTOR*

Background Paper

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PRE-INVESTMENT CONSIDERATIONS IN THE FRUIT AND VEGETABLE PROCESSING SECTOR

I. OVERVIEW

Characteristics of the sector

The processing of fruits and vegetables is characterised by the very great variety of raw materials depending on the natural endowments of producer countries - climate, soil, altitude, agricultural capabilities of farmers, seed varieties and harvesting and storage methods. The variety is further extended when it comes to semi-processed or processed products because of the many different types and levels of activities to transform raw materials to a stage when they can be finally sold or consumed.

There is also a very great variety of forms and sizes of fruit and vegetable processing units, ranging from cottage industry type with simple equipment and few or no employees, to small sized units in the informal or formal sectors utilizing simple to more complicated technologies, larger units run on more modern lines but rather labour intensive sometimes operating under licence agreements, and large-scale units with sophisticated and more capital intensive equipment often operated by transnational corporations (TNC's). Again, most of the units depend completely on suppliers of raw material from outside the firm, while others have semi-integrated or fully integrated production. At the end of the line, the finished goods take different forms depending on the degree of processing that takes place before they are sold, ranging from very simple treatment (cleaning, trimming, packing,) to more advanced processing (drying, pulverizing) and more complicated processing (cooking, extraction of juices, slicing, canning, dehydration, freezing). There are also differences in the type of finishing and presentation of fruit and vegetable processed products depending on whether these are meant for consumption in rural or urban areas of producer countries, or for the highly sophisticated export markets in industrialized countries.

In view of the multiple types of raw materials, levels of processing, technologies utilized, sizes of processing units, and degree of sophistication of markets, there can therefore be no standard approach in dealing with the sector as with other manufacturing sectors like textiles, iron and steel, chemicals, wood and wood products etc. where standard specifications may apply. Investment considerations therefore have to be studied on a case by case basis starting with market possibilities, raw materials supply and the activities that come in between procurement and selling.

Nevertheless one will endeavour to outline in general terms, the conditions that must prevail and the factors that are to be considered before an investment decision to set up a fruit and vegetable processing unit is taken. Such factors include future trends and perspectives for the sector, national policies which may either encourage or inhibit the growth of the sector, and basic considerations that must be made at micro-level to ensure successful market penetration, adequate raw material supply, profitable processing activities and proper financing arrangements. Since TNC's are very well established in all activities pertaining to the sector, their role will also be considered.

Economic features of interest to developing countries

There are a number of basic economic features present in the processing of fruit and vegetables which are of particular interest to developing countries, namely:

- the supplement to the satisfaction of food requirements (although processed fruits and vegetables with some exceptions are not staple foods, they supplement the diet and provide additional nutrients);

- the utilization of agricultural raw materials that may lead to an improvement of incomes of the direct producers and to some stability in consumer prices, providing at the same time incentives to the modernization of agriculture;

- the use of technologies that make possible the preservation of perishable products, the reduction of losses between stages of primary production and final consumption, the recovery of by-products and the recycling of wastes;

- the use of capital which, under certain technological options, could be lower than in many other industrial sectors;

- the upgrading of traditional agricultural exports which contributes to the diversification of exports, opening of new outlets and increased export earnings;

- the possibility of developing fruit and vegetable processing as an early phase in the industrialization process leading to multiplier effects on the development of other secondary or tertiary sectors of the economy.

II. TRENDS AND PERSPECTIVES

International Trade

It is a well-know phenomenon that the share of agro-industries, including fruit and vegetable processing, in the total manufacturing value added tends to decrease with the passage of time and the pace of development since economic growth alters the structure of consumption and production patterns. The share of agriculture and primary industry diminishes while that of other manufacturing and capital goods industies and of service industries grows. But this does not mean that agro-industrial or fruit and vegetable prooduction is falling in absolute terms.

As it can be seen from Table No 1, imports of processed fruit by market economy countries has increased from US$ 4,565 million in 1982 to US$ 5,460 million in 1986. More importantly, the share of imports by developing countries has drastically diminished from 14,9% to 7,4% in the 5-year period. This proves that developing countries have become more reliant on self-production in processed fruit. Working this out in absolute terms it means that developing countries reduced their imports of preserved or prepared fruit by no less than US$ 276 million in the period under review.

The same conclusion can be derived from the analysis of Table No 2 on international trade in processed vegetables where it is shown that imports by market economy countries increased from US$ 3,327 million in 1982 to US$ 3,726 million in 1986 while the share of imports of developing countries went tremendously down from 14,5% to 4,4% or by US$ 318.5 million in the same period.

Fruit and vegetable juices, which are of very great interest to developing countries and which represent a substantial proportion of trade in the sector, have also performed in the same fashion, as can be seen from Table No 3.

International Trade in Fruit Preserved or Prepared (SITC 058)

Region	Imports					Exports				
	1982	1983	1984	1985	1986	1982	1983	1984	1985	1986
World Market Economy (million US$)	4565	4293	5134	4893	5460	4688	4770	6262	4673	5025
Share of Developing Countries (Percentage)										
Africa	1.3	1.3	1.0	0.8	0.8	4.6	8.3	5.8	7.2	4.4
L.A./Carribean	1.8	0.9	0.8	0.9	0.7	33.5	33.3	46.9	27.3	25.2
Asia	11.8	10.3	8.4	6.3	5.9	14.9	13.4	12.1	18.7	16.9
Total	14.9	12.5	10.2	8.0	7.4	53.0	55.0	64.8	53.2	46.5

Source: U.N. International Trade Statistics 1986.

Table No 1

International Trade in Vegetables etc, Preserved or Prepared (SITC 056)

Region	Imports					Exports				
	1982	1983	1984	1985	1986	1982	1983	1984	1985	1986
World Market Economy (million US$)	3327	3351	3439	3241	3726	2579	2680	2676	2624	2874
Share of Developing Countries (Percentage)										
Africa	5.6	5.1	4.8	5.1	5.8	2.8	3.4	3.0	3.1	2.0
L.A./Carribean	1.3	1.5	1.3	1.6	1.2	3.7	6.5	3.9	3.4	2.5
Asia	16.4	18.9	16.4	14.5	12.3	17.7	17.3	16.4	16.3	11.9
Total	23.3	25.5	22.5	21.2	19.3	24.2	27.2	23.3	22.8	16.4

Source: Extracted from U.N. International Trade Statistics 1986

Table No 2

International Trade in Fruit and Vegetable Juice (SITC 0585)

Region	Imports					Exports				
	1982	1983	1984	1985	1986	1982	1983	1984	1985	1986
World Market Economy (million US$)	2132	1978	2724	2560	2628	1861	1888	4031	2431	2477
Share of Developing Countries (Percentage)										
Africa	0.9	0.8	0.6	0.4	0.6	2.4	3.5	1.7	2.9	2.0
L.A./Carribean	0.8	0.5	0.5	0.6	0.5	38.5	37.7	69.8	48.9	46.9
Asia	12.8	7.6	5.4	4.3	3.3	11.0	9.3	5.7	10.5	9.3
Total	14.5	8.9	6.5	5.3	4.4	51.9	50.5	76.2	62.3	58.2

Source: Extracted from U.N. International Trade Statistics 1986

Table No 3

A study of the Tables No 1 and No 2 also shows that exports of processed fruits and vegetables by world market economy countries have gone up between 1982 and 1986 while the share of developing countries has generally decreased in the same period. However, as regards fruit and vegetable juices (Table No 3), developing countries have increased their share in exports from 51,9% in 1982 to 58,2% in 1986 (with a peak of 76,2% in 1984 which was due to abnormal exports of citrus juice from Latin America, mainly Brazil, to USA to meet the unsatisfied demand created by very poor harvest in the USA arising from plant deseases).

The declining share of developing countries in the exports of processed fruit and vegetables, other than fruit juices, will be considered later, but meantime, it should be pointed out that fruit and vegetable appear to have the better prospects for the future since they showed resilience against the general export trends of other products in the sector.

World trade in fruit and vegetable juices increased very significantly during the periode 1977-1981 from about 1,3 million tons valued at about US$ 1,100 million to nearly 1,7 million tons, on about US$ 2,000 million.1/ Furthermore, world trade in tropical fruit juices, concentrates and pulp (excluding pineapple - and probably two-thirds of which consist of passion fruit and mango) is estimated to be in the range of 70-80,000 tons in single strength equivalent, amounting to an estimated US$ 100 million. This corresponds to about 4% (by value) of total world trade in fruit juice.2/

Turning to international trade in processed vegetables, the bulk of the trade is in dehydrated vegetables. Dehydrated vegetables are defined as "vegetables, dried dehydrated or evaporated (excluding leguminious vegetables), whole, cut, sliced, broken or in powder, but not further prepared" (SITC 056.1 Rev2) although the term often refers to artificially dehydrated vegetables. Total world trade in dehydrated vegetables in 1979 was in the region of 105,000 tons, valued at US$ 325-350 million. Industrialized

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1/ The World Market for fruit juices, ITC, 1982.

2/ Market Opportunities for processed tropical fruit products with special reference to juices and similar products, ITC, 1987, unpublished.

countries taken as a group accounted for 47,4% of the total volume of exports in 1979 while East European countries for 14,4%. Developing countries supplied over 36,000 tons accounting for about 38% of total exports in the same year.3/

Prospects for developing countries

Reference has earlier been made to the reduction of exports of processed fruit and vegetable, excepting fruit juices, by developing countries in the period 1982-1986. The reasons may be many, but some underlying factors may be mentioned. It has already been pointed out that national markets for processed fruit and vegetables have expanded along with improvements in the standard of living, and as a result, less production was made available for exportation. The small to medium producer would prefer to sell on the local market which he knows and which is less sophisticated and demanding. He would not have to undertake complicated administrative work involved in exporting, feels more at ease with collection of payments and runs no foreign exchange risks in an age of highly volatile currency conversion rates. Urbanization has created a middle class of better earning capacity and of changing consumer patterns which expands the demand for processed fruit and vegetables even though they sell at much higher prices than raw produce. The development of tourism in many developing countries has also created a demand for well prepared and easy-to-serve fruits and vegetables of uniform standard on restaurant tables.

This has its favourable aspects not only from the point of view that it strengthens the national industrial development and utilizes produce which could otherwise have gone to waste, but also in that it provides for a stronger basis and competitivity for entering the export market, for example by pricing export items on a marginal cost basis since fixed costs of production would in large measure be already covered by local sales.

3/ The market for dehydrated vegetables in selected European countries, USA and Japan, ITC 1981.

But perhaps a more important reason for the drop in exports by developing countries has been the effects of the economic recession during this period in Europe and the United States. An important underlying demand factor is the income elasticity of demand which is particularly high for products which are not staples - such as imported processed fruit and vegetables. Short-term variations in incomes tend to result in variations in the same direction in demand. At a time of economic recession, unemployment and reduced earnings, consumers would go only for basic necessities and for cheaper substitutes of traditional products e.g. diluted as against full strength fruit juices, locally grown produce which is cheaper than imported canned produce.

Also a recent trend in demand patterns in the major importing countries has been the growing awareness in health consciousness and the consequent demand for natural pure products. So processed fruit and vegetables have to compete with a growing demand for fresh produce.

In spite of this, demand for processed fruit and vegetables in industrialized countries is expected to rise again once these countries emerge from the economic recession and the population of consumers with effective demand grows. Also, with the reduction in unemployment figures, more and more consumers would tend to return, at least to an appreciable degree, to prepared "quick" foods because of their convenience for working housewives and for restaurants whose business becomes more active with the lifting of an economic recession.

Furthermore, as more and more tourists from industrialised countries visit developing countries, they become acquainted with exotic fruits and vegetables and develop a taste for such products. It is considered that this fact is bound to increase the demand for tropical food. Also, the rapid development of air-freight and shipping facilities, and better technology for the preparation of foods exported by developing countries, facilitate the transport of exotic foods in larger volumes and at more competitive prices.

ITC believes that the international trade in fruit juices and related products could further expand in the future.

Firstly, annual per capital intake of juices is still fairly low in many markets - 5-15 litres in Belgium, United Kingdom, France and Japan, for example, compared with 20 litres or more in Finland, Sweden, the Federal Republic of Germany, Canada and the United States. A number of markets still, therefore, have considerable growth potential. Secondly, demand should also continue to receive a boost from the growing health consciousness of consumers, new developments in product lines and packaging, and more aggressive marketing being undertaken by the juice industry. Thirdly, fruit juice raw material is used more and more in other food products, e.g. dairy products, in particular in yoghurts, bakery products and baby food.

As far as tropical fruit juice raw material is concerned, most major markets show a growing interest partly as a result of promotional activities undertaken by the beverage and food industries and partly because more and more consumers travel to countries where they eat the fresh tropical fruit. On return, they seek both the fresh fruit and the products made from them. On most markets, however, the taste for tropical fruit juice beverages is an acquired one, and a considerable period will need to pass before they gain full consumer acceptance. The fact that tropical fruit juices are fairly expensive compared with citrus and the more traditional juices is also an important consideration.

Another more fundamental problem that may impede the long-term development of the tropical fruit industry, is the lack of regular and consistent supplies of good quality products, which the processing industry needs to build up the market. This is particularly true of the passion fruit industry which has also suffered greatly over the years from very wide and frequent price fluctuations.

On balance, prospects for increased world trade are believed to be good, though any rapid development is unlikely. 4/

4/ Market Opportunities for tropical fruit products, op.cit., pp. 8, 9.

As regards dehydrated vegetables, 5/ the general view of the trade is that the markets are more or less saturated. This seems to be especially true in the two largest import markets, the Federal Republic of Germany and the United Kingdom, where the soup market appears to be stagnant. Some import markets however e.g., the United States, Japan, France, Netherlands, Sweden and Norway, may offer limited growth potential in the immediate future. However, Sweden and Norway are small markets and the other markets have a large domestic production. It should also be noted that some markets, e.g., Canada and Australia, have shown considerable growth in recent years.

There is also a number of smaller, non-traditional markets in developing countries or areas, e.g., Venezuela, Republic of Korea, Mexico, Hong Kong, Singapore, Brazil, Colombia, Saudi Arabia and Morocco, with growing consumption of western-type food. Although some of these countries are important producers themselves, they may offer import possibilities for certain types of vegetables supplied by other developing countries.

In spite of the general lack of, or limited, growth potential in most markets in the short term, several importers and end-users believe that the market for dehydrated vegetables could grow further. Such further growth would depend on the general development of the world economy and other development, by the food industries, of new products with dehydrated vegetables as ingredients or extension of the existing range of products such as soups and sauces to include new flavours. Such developments would also provide an opportunity for the introduction of new vegetables including tropical vegetables in dehydrated form. It should also be noted that the research carried out revealed a growing interest in certain dehydrated fruits such as pineapple, mango and various berries.

ITC findings indicate that the existing well-known product range - onions, mushrooms, leeks, tomatoes, garlic, beans and bell peppers - has a good stable market and that there is a steady but very competitive market for carrots. Certain other dehydrated vegetables, e.g., cabbage, courgettes, swedes, asparagus, cauliflower and some culinary herbs, may find small but interesting markets.

5/ The market for dehydrated vegetables, op.cit., pp. 3,4.

Most products traded internationally are dehydrated by the hot-air process. Freeze-dried vegetables only account for a small part, perhaps 2-3 per cent, of total imports of these products and most of this is probably culinary herbs. However, rapid rehydration is becoming more and more important, e.g., for instant soups, and there is a growing demand for freeze-dried and other instantized products.

On the supply side, local production of dehydrated vegetables in the markets in question is likely to stabilize at its present level or even to decline in the future owing to higher labour costs and the high costs of raw materials; a similar long-term trend is likely in certain Eastern European countries that currently export large quantities of dehydrated vegetables. It is reasonable to conclude that developing countries will benefit from this situation in the long run provided that exporters can meet the market requirements, particularly those of quality and delivery time.

Finally, an important consideration that should be borne in mind when market opportunities for processed fruits and vegetables are being evaluated is the existence of concessions granted under the Generalized System of Preferences (GSP) and duty-free access to the EEC market for African Caribbean and Pacific (ACP) Countries under the Lomé Convention. Developing countries should take this into account when selecting target markets and when considering new investments, including joint ventures, etc. Furthermore, developing countries should be wary of investing in new production facilities unless based on carefully prepared and up-to-date feasibility studies, market surveys and realistic marketing plans.

III. THE INVOLVEMENT OF TNC'S IN THE FRUIT AND VEGETABLES PROCESSING SECTOR 6/

There is a significant to dominant presence of TNC's in the world processing sector, for practically all agro-industrial products, including fruits and vegetables. Their involvement in processing activities in developing countries has been largely in terms either of producing for final consumption in the local market by higher-income urban consumers, or of producing intermediate products for export to affiliated companies which carry on processing to the final stage and marketing in industrialized countries. These has been only limited success in developing countries by domestically-owned firms entering into competition with TNC's through the introduction of indegenous brand names or expanding into foreign markets.

Interest by transnational corporations in both the export and the local market-oriented fruit and vegetable industries of developing countries has increased greatly in recent decades. Some 33 leading food-processing firms have more than 140 investments in this sector in developing-countries . Both the structure and extent of transnational corporation activities, however, differ substantially between the local market and export-oriented industries. In export-oriented activities, the most important operations are in bananas, canned tropical fruits (mostly pineapples), and fresh produce. For the enterprises primarily oriented to local markets, canning and dried-product activities are most significant.

After the trade in bananas, mainly in raw form, canned pineapple is the second export industry which transnational corporations have entered on a large scale. In the early 1960s, production based in the United States (Hawaii) began to be phased out, and the three leading firms - Del Monte, Castle and Cooke and Nestlé (Libby's) expanded their developing country activities. Processors based in Japan increased their foreign operations in the same period in order to supplement inadequate domestic supplies. Europe's more limited demand was met by supplies drawn from suppliers based in Asia and Africa (particularly the Côte d'Ivoire).

4/ See Transnational Corporations in food and beverage processing, UNCTC, 1981, pp. 51, 53, 56, 58.

The most important growth in the industry took place in the Philippines and Thailand in Asia, and Kenya and Côte d'Ivoire in Africa. By 1976, the major United States transnational corporations (Del Monte, Castle and Cooke) had affiliates in the Philippines and Thailand, whose output was exported largely to the United States. From Kenya, Del Monte sells most of its output in European markets, while three smaller transnational corporation plants in Côte d'Ivoire sell most of their products in the French market, where they enjoy tariff protection. In Thailand, where pineapples constitute about 90 per cent of the canned fruit and vegetable industry, Japanese investors are also present. Although transnational corporations appear to dominate the industry in most countries where expansion is taking place, in Thailand national entrepreneurs are also important, with four of the nine companies fully-owned by local capital. However, the non-transnational companies continue to face problems of market acceptance and differential tariff barriers in seeking to enter the home country markets of transnational corporations.

Processed orange juice (primarily frozen concentrate) for export has also been an expanding industry, particularly in Brazil, where the bulk of the investment has been undertaken by local firms for sales in North America. There are indications of some direct transnational corporation involvement, however, particularly by foreign food-machinery manufacturers, and an interest in trading by processors based in the United States.

Foreign affiliates of transnational corporations engaged in fruit and vegetable canning began to increase greatly in number and volume in the early 1960s. Processors based in the United States led the move into European countries, where United States shipments of these products had found themselves increasingly restricted under the European Economic Community Common Agricultural Programme. At the same time, United States canning-industry leaders, including Heinz and Campbell Soup, and smaller but sectorally important firms, such as Gerber, Anderson Clayton, McCormick and Pet Inc., established or expanded canning activities by Latin American affifiates. Several large firms based in the United Kingdom, such as Brooke Bond Liebig, Reckitt and Coleman and Rank Hovis McDougall, followed the same expansion path, primarily in African and Asian Commonwealth developing countries. Nestlé and Unilever are also engaged in the industry.

By 1976, some 19 of the leading food firms had two or more identified developing country affiliates engaged in fruit and vegetable canning for local markets. Another 14 transnational corporations had at least one such affiliate as well as developed-country operations. Half the affiliates are in countries with large urban consumer markets. In Mexico alone, 14 major transnational corporations were engaged in such activity, and Brazil and Venezuela were each host to 13 affiliates. Although the capital and technical requirements for these activities are inconsequential as entry barriers, the transnational corporations appear as market leaders in all developing country markets for which data are available. The effectiveness of their marketing and promotional activities is undoubtedly a major explanation for this dominance.

Five companies - Nestlé (Maggi), CPS (Knorr), Unilever, General Foods and Brooke Bond Liebig - dominate both developed and developing country markets for dehydrated soups and vegetables. Nestlé has the most extensive affiliate network (22) in developing countries producing these products, but CPS (10), Unilever (7) and Brooke Bond Liebig (4) have all established important market shares.

The significance of canning and related activities is still relatively small in terms both of nutrition and of the local market in most developing countries. The estimate of FAO is that only half the fresh produce of developing countries is marketed off farms. Of this, about 10 per cent is exported and 2 or 3 per cent industrially processed. The processed products will continue to be largely oriented towards higher-income urban consumers in those countries.

IV. CONSIDERATIONS AT MICRO-LEVEL

Seasonality, perishability, variability 7/

Fruit and vegetable processing can be roughly categorized according to the degree the raw material is transformed. In general, capital investment, technological complexity, and managerial requirements increase in proportion to the degree of transformation. The purposes of transforming raw materials are to create an edible or usable form, to increase storability, to create a more easily transportable form and to enhance palatability or nutritional value. Agro-industry is unique because of three characteristics of the raw materials: seasonality, perishability, and variability. Each of these main characteristics merits brief discussion.

Because raw material is seasonal, available at the end of the crop cycle, raw material supply is usually available only during one or two brief periods during the year, while the demand for the finished product is relatively constant throughout the year. Unlike the non-agroindustrial manufacturer, fruit and vegetable processing must contend with a supply-and-demand imbalance and problems of inventory management, production scheduling, and co-ordination among the production, processing, and marketing segments of the farm-to-consumer chain.

Raw materials are perishable and often quite fragile. For this reason, they require greater speed and care in handling and storage, which can also affect the nutritional quality by reducing the damage or deterioration of the raw material.

Quantity is uncertain because of weather changes or damage to crops from disease. Quality varies because standardization of raw materials remains elusive, even though there have been advances in plant genetics (this is in sharp contrast to the extensive specifications for standard materials used in other manufacturing indusries). These variations exert additional pressure on the plant's production scheduling and quality-control operations. Furthermore, the raw material is usually the major cost component. Thus, procurement operations fundamentally shape the economics of the enterprises.

7/ See Agro-Industrial Project Analysis, James E. Austin, E.D.I. World Bank, 1981, pp. 1, 4, 5.

Keeping the above considerations in mind, fruit and vegetable processing projects must be meticulously planned on three basic considerations , namely marketing, procurement and processing. All these have a great bearing on financial aspects at each activity stage and on the profitability of the enterprise.

Marketing considerations 8/

Consideration of the marketing factor is vital because it provides the market information to assess a project's viability. Too frequently, a firm's substantial efforts and investments are put into procurement and processing operations - the other two of agro-industry's three main areas of activity - only to have the expected benefits never materialize because of an inadequate marketing analysis. These principal activities of agro-industrial projects are closely interdependent.

Because projects enter pre-existing markets, it is essential that firms know the market environments. Accordingly, marketing analysis should examine consumers and competitors. A consumer analysis should identify consumer needs, potential market segments, and the buying process. For this analysis, the firm must conduct market research. A concomitant analysis of the competitive environment should describe the market structure, the basis of competition, and the institutional constraints affecting competition.

From analyses of the consumer and competition, a firm formulates its project's marketing plan. The plan should elaborate the project's marketing strategy for product design, pricing, promotion, and distribution. These elements of the marketing mix should be integrated in a comprehensive strategy that will place the product in an optimal marketing position relative to consumers' needs and competing products. The marketing plan should also consider the rest of the company's product line as well as the company's organizational, financial, production, and procurement operations to ensure the cohesion of the project's strategy. Once a marketing plan is adopted, the firm should anticipate the competitive reaction and formulate a response that will maintain the project's viability in a dynamic market environment.

8/ See Agro-industrial Project Analysis op.cit., pp. 68, 69.

The marketing analysis uses and is developed with the demand forecast. The types, sources, reliability, and underlying assumptions of the data used in the forecasts should be very carefully considered to ensure sound forecasting and reduce uncertainty in investment decisions.

Procurement considerations 9/

Because of the transformative nature of agro-industries, the processing plant's input of raw material is critical. Defects in procurement and supply are often magnified in the processing and marketing activities. Raw material costs are also, in general, the major cost of the agro-industry. Moreover, the organization of the project's procurement system can significantly determine its socio-economic benefits.

The effective procurement system attempts to obtain a quantity of raw material that will satisfy both market demand and a plant's processing capacity. Defining that quantity requires an examination of the raw material's historical, current, and projected planting area, yields, and alternative uses. The raw material must also meet the desired qualitative requirements. The quality of raw material is affected by farm inputs, cultural practices, and storage and transport services. The plant will need quality-control mechanisms to monitor and upgrade its raw material.

In addition to obtaining the desired quantity and quality of raw material, the procurement system must also ensure that the raw material is delivered to the plant at the appropriate time. Timing is complicated by several factors. The seasonality of production, inherent in the biological nature of the raw material, causes an uneven flow to the factory. This cyclical pattern creates a peak flow, which requires extra processing or storage capacity. The agro-industrial firm should consider methods to spread the flow of raw material more evenly. The perishability of raw material similarly emphasizes the timing of the system's movement of produce from the farm to the factory. Storage and processing techniques can reduce losses to perishability. Availability - determined by the raw material's growth cycle and the expected duration of supply - also affects procurement timing. Before making the fixed plant investment, a firm should ascertain the certainty of supply and the relative permanency of the crop.

9/ See Agro-industrial Project Analysis, op.cit., pp. 114 - 116.

Although the quantity and quality of the raw material and the timing of its procurement may all be acceptable, the procurement system is not economically viable unless the raw material is reasonably priced. The cost must be low enough to allow the processing plant to generate a profit that yields an acceptable return on investment. The main factors affecting costs include supply and demand, opportunity costs, structural factors, logistical services, and governmental interventions.

The mechanisms and alternatives for establishing raw material prices should similarly be evaluated: spot prices, multiple sources, governmental price supports, contracting, joint ventures, and backward vertical integration. In addition, one should calculate the sensitivity of profits and investment returns to changes in raw material prices.

The procurement system's overall effectiveness ultimately rests on its organization. To achieve this organization, the firm should begin by studying the farm-to-factory structure, which is built upon the number, size, and location of farmers, middlemen, transporters, storage operators, and other industrial buyers. One should also examine the pattern of farmland ownership, existing degrees of vertical integration, and the volume and channels of commodity flow. The plant's major alternative to using the existing structure is backward vertical integration, and the desirability of this alternative should be assessed in relation to control, capital requirements, flexibility, costs, social effects, and political feasibility. One should also determine whether producers are, or could be, grouped into cooperative organizations and how such organizations would affect the agro-industry's procurement system. One should also explore the possibility of farmers integrating vertically forward into processing.

Processing considerations 10/

A primary element in processing is technology; it must be tailored to fit the market's requirements. The nature of the production process will impose certain limits on choi-e of technology - for example, a minimum economic size. This may be a constraint for small-scale enterprises. Another critical selection criterion is cost, and here one should examine the possibilities of

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10/ See Agro-Industrial Project Analysis, op.cit., pp. 160, 161.

the substitution of labour for capital as well as the relations between energy and raw material usage. Other criteria for technology selection include capacity use (the technology's contribution to minimizing the plant's down time because of seasonality) and management capabilities (to meet the supervisory and technical demands of the technology). The processor should also consider the potential nutritional consequences of the technology.

Another decision the processor must make is plant location. The value of locating near the markets or the producers of raw materials depends on the nature of the raw materials, the transformative process of the agro-industry, and the cost and reliability of the needed transport services. Labour supply, the availability of infrastructure, land costs, and the developmental effects of the project are additional considerations for plant location.

Inventory management also requires special attention because of the constraints of seasonality. The processor must determine the correct mix of raw and semi-processed material and finished goods for optimal processing capacity. Adequate physical facilities are essential to prevent losses in product quantity and quality from pest and insect infestation or microbial growth. The raw material's seasonality accentuates the plant's needs for working capital and the inventory's exposure to price risks. The processor should explore the methods of handling both.

Processing supplies, particularly for packaging, are important in the manufacturing operation. The quantity and quality of the supply, the cost and dependability of delivery, and the nutritional effects of the packaging need to be assessed. Programming and control procedures should also be reviewed to ensure that production design and quality control will be adequately carried out. An implementation plan, project engineering, and a master production schedule should be drawn up before starting production. Finally, almost all agro-industries generate by-products. Because these can be important to the project's economics, the processor should estimate their financial contribution.

V. CONSIDERATIONS AT MACRO-LEVEL

National Planning

Through national planning and consequent policies, Governments can play a determinant role in encouraging the integrated development of the agro-industrial sector through policy measures which strengthen agriculture and increase its linkage with the industrial sector. The fruit and vegetable sector has to be integrated with the rest of agro-industry and with other manufacturing industry, promoting forward and backward linkages wherever possible. Allied industrial activities that need integrating include the manufacture of fertilizers and pesticides, the manufacture of tools, equipment agro-machinery, transport equipment, and last but not least, packaging materials. Such integration facilitates the development of the sector, reduces the costs of inputs, and in the case of imported inputs, saves foreign exchange.

Although Governments' target areas would be staple foods, the fruit and vegetable sector is bound to receive appreciable attention since in some countries certain fruits and vegetables may be considered as staples (banana, potatoes, casavas) and since, in many cases, there is overproduction of seasonal fruit and vegetables which, if not processed, would go to waste. Besides, it is well appreciated that the development of the sector supplements the food supply, can give an important boost to rural development, and increase incomes and employment. The sector too can be a foreign exchange earner through exports, or a foreign exchange saver through import substitution.

There are obviously many activities, which small- and medium-scale entrepreneurs, who constitute the majority in the sector and who include probably all the indigenous processors, cannot afford to finance. The degree and level of government involvement and financing in the above activities, are determinant pre-conditions for the development of the fruit and vegetable sector and for attracting local and foreign investments to the sector. Government activities mainly concentrate on:

- ensuring an adequate supply of raw materials, of the right quality, at the right price and at the right time;

- creating facilities for the quick transfer of produce from farms to processing units to avoid post harvest losses;

- supporting processor to be able to accept all available farm produce and to obtain a fair return on their investments.

Going by the cycle of the production process, government policies and budgetarly allocation must be made for

(i) increasing and up-grading the productivity;

(ii) installation of adequate storage and handling facilities;

(iii) extension of infrastructural facilities - roads, transport, supply of water, electricity, telephones etc.;

(iv) supply of agricultural inputs - fertilizers, persticides, tools, agro-machinery;

(v) establishment of extension services;

(vi) promotion of investments through the grant of financial and fiscal assistance to primary and secondary producers;

(vii) setting up or strengthening of institutional support organizations for distribution of agricultural inputs, marketing of off-farm produce, extension services, provision of finance, creation of co-operatives, and export marketing.

Physical and Industrial Infrastructure

The increase of productivity in the primary production of fruit and vegetables can be made by surveying and putting new areas under cultivation, but more importantly, by the adoption of modern methods of farming to increase the yield per hectare. It is a well known fact, that traditional farming in developing countries constantly produce low harvest yields due to poor selection of seeds and lack of use of fertilizers and pesticides. The problem here is not only financial but also institutional. Farmers have to be educated to accept and to adopt modern farming techniques. Mechanisms have to be established for the procurement and distribution of farm inputs. Apart from quantity, modern farming methods go a long way to ensure that produce is of the right quality and of uniform standard as required for processing.

As it has already been mentioned, only about 50% of farm produce is marketed and only 2% to 3% of it goes for processing. Given that produce consumed on the farm cannot be as high as 50%, it follow that a large proportion of produce goes to waste because of the inability of farmers to dispose of the produce. This originates from lack of roads and adequate

transport systems, proper storage facilities, as well as suitable organization of the marketing function. While roads have to be financed and constructed by Governments (exept for very large concerns such as TNC's which might include road contruction in their planning for very large scale projects), the question of establishing storage, transport and marketing facilities may often be tackled by co-operatives. But here too, governments must undertake positive action through legislation, provision of credit, training and promotive efforts to create co-operatives. Co-operatives may also be utilized for the bulk purchase and distribution of fertilizers and pesticides and other farm inputs.

Of more interest to Governments as such would be research and development in terms of the experimentation concerning the yields of different seeds, and types and methods of application of specific fertilizers and pesticides, and the provision of technical assistance to farmers through extension services.

Fiscal and Financial Incentives

In the absence of storage facilities in the cultivation area, the other alternative is to shift the onus of storage to processors. In this case processors may require Government assistance to provide bigger-than-normal storage facilities. This may be provided through adequate credit facilities, fiscal incentives, discriminatory rates for energy consumption etc.

Government support for processors may include the provision of special credit to assist them to finance large stocks of raw material given the seasonability of the trade, fiscal assistance (lower rates of duty) for the purchase of other intermediary inputs (e.g. packaging), tax allowances for marketing studies, marketing trips, participation in trade fairs, and providing supporting facilities for marketing of finished goods at the national level. General monetary policies of the government also affect producers directly and tend either to increase or decrease their costs of production, and in turn competitivity, especially on export markets. Governments are therefore to pay great attention as regards availability of credit, rates of interest, availability and rates of foreign exchange and wage rates and their incidence on processing industry.

Since processed fruit and vegetables are not considered as staples the question of price control does not often arise. However, in cases where it does arise, one should be careful not to control the price of finished goods to obtain lower priced goods for consumers at large at the sacrifice of the farmers or processors. Each of these should obtain their fair share of the price and an adequate return on their labour and investments. If this does not happen, one can expect farmers to switch on to other more profitable activity, or to return to just subsistence farming thus putting the clock backwards and limiting the food supply.

Technology and TNC's

Another important area for Government support is in the selection of suitable processing technology through the establishment or strengthening of institutions which may advise prospective investors. Technology has also to be adapted to local conditions. Technology is often obtained under licence agreements which would incorporate the payment of royalties in hard currency and, often enough, a number of restrictive clauses. The Government institution in charge of registering such agreements, often a section of the Central Bank since payment of royalties is involved, would do well to evaluate agreements to limit the outflow of funds in terms of royalties, and generally to see that unwarranted restrictive practices are not allowed.

This leads us to Government policies concerning TNC's, in a sector which to a great extent is dominated by TNC's. The involvement of TNC's and constraints arising out their presence in developing countries are dealt with elsewhere in this paper. Suffice here to say that TNC's formulate their strategies to suit the large scale of their operations, and they have many alternatives from which to choose with respect to operating sites, kinds of production and types of technology. They have no particular reason to tailor their strategies to accord with the wishes of host countries. On the other hand, authorities in developing countries have learnt from past mistakes and are better able to negociate with TNC's. In some cases, depending on the a country's stage of industrialization, its scientific and technological capabilities, its size and natural resources, co-operation with TNC's may prove to be indispensable for the sake of faster economic growth. It is also not to be forgotten that although TNC's continue to expand their activities world-wide, their growth has been disappointing with regard to developing

countries, and the inflow of foreign direct investment during the 80s has remained considerably below levels achieved in earlier periods. A more pragmatic and businesslike relationship between host governments and TNC's has emerged in the past decade. Many developing countries, burdened by external debts and economic stagnation, have liberalized their policies towards TNC's, while these corporations have displayed greater sensitivity to the development and economic goals of host countries. The era of confrontation has receded and has been replaced by a practical search for a meaningful and mutual accommodation of interests. 11/

11/ TNC's in World Development, Trends and prospects, UNCTC, 1988.

VI. FINANCIAL CONSIDERATIONS

Pre-investment studies

As it has been emphasized, the specific features of the fruit and vegetable processing sector relate to the difficulties of knowing the market conditions, of ensuring permanency of supplies of raw materials and other inputs, and of managing the processing activity based on the uncertainty of seasonal crops while making use of different technologies depending on the varied types of raw materials, levels of processing, different packaging etc. Undoubtebly, these features bring with them special financial considerations to ensure that projects are adequately financed from the points of view of fixed capital and working capital requirements.

The first point to be made is that in-depth studies on these features should be made in order to reduce the uncertainty in forecasting. Such studies most often are beyond the capabilities of the local entrepreneur, who would have to call in consultants for the job. Such studies cost money and are to be considered as fixed capital investment to be recouped during the lifetime of the project. The importance of undertaking realistic feasibility studies covering all these areas cannot be over-emphasized enough, since wrong assumptions at feasibility study stage will compound themselves into grave difficulties when it later comes to financial management of the project.

It is advisable to start feasibility studies by an in-depth study of the target markets, and their special requirements, rather than by the apparent availability of supplies of raw materials. The problem seems to be more that of knowing the market, the competitors, their market shares, the existence of brands, market strategies of competitors, (e.g. advertising, distribution systems, storage and financing of stocks) and the expected degree of market penetration, rather than that connected with production. And desk research of markets is often not enough especially in the case of exports - meaning that prospective investors must travel to assess markets in target countries, learn of specific import regimes, regulations and specifications required to satisfy consumer demands, and make personal contacts with potential buyers. These activities also cost money and have to be catered for at the pre-investment

stage. Indeed, it is highly inadviseable to enter into further costs in developing the feasibility study or indeed in starting to implement the project, unless the market research is seriously undertaken and it is considered that there is a high probability of sucessfully penetrating the market which is often dominated by powerful TNC's, branded products, and established networks of warehousing and distribution channels. One important point to be made here is that what counts is not the size of the market, but the realistic possibility of penetrating the market and to what extent. Many a project in developing countries has failed becauses it was assumed that the market, especially the export market, is practically unlimited. This is a myth. Therefore funds invested in realistic market studies are funds well invested.

Before leaving this part on pre-investment studies, two other important points have to be made. Many feasibility studies assume that production through-put is equal to the rated capacity of plant. This is another myth. Idle time, both that pre-planned for maintenance of that occasioned by mechanical failures, electricity breakdowns, absenteeism or temporary absences by workers, unavailability of spare parts, delays in obtening production inputs etc., have to be considered. Furthermore, it may not be always possible or desireable to operate plant at 100% capacity from the engineering aspect, so that the optimum operating capacity is often less than 100%. This of course has an important bearing on the total production achievable, and in turn, on total sales and revenues.

Another frequent defect in pre-investment studies in the assumption that production and sales can grow by 50% or even 100% from one year to another during the first few years of implementation of a project. Although this may appear feasible on paper based on rated plant capacities and increase in the number of workers, it is very rarely achievable in practical terms. Difficulties include teething troubles, changes in the organizational structure of the firm to cope with increased production, availability of supervisory and skilled labour, and increase in the sales parallel with increased production. Quite often it is assumed that there is a ready market waiting for the increased production. Experience has shown that in reality, expansion of production and sales are more gradual than those assumed in many feasibility studies.

Finally, in a sector such as that of fruit and vegetable processing where uncertainties exist on the volume of raw materials available, penetration of markets and buying and selling prices, sensitivity analysis should be undertaken to forecast results based on possible variations in these areas. This would assist the investor in appraising the best or the worst situations, and in making appropriate investment decisions. It would be well to keep in mind, that where uncertainties exist, it may be opportune to start small (minimum economic unit) and to cater for expansion as experience and market demand indicate.

Financing of Working Capital

Having dealt with the marketing aspects, the next priority is to assess the financial aspects connected with the procurement of adequate and permanent supplies of raw material and other inputs. Here again, the importance of in-depth studies cannot be over-emphasized. It is not enough to work on a hunch that supplies of a certain raw material are abundant because the markets of fresh produce overflow with the raw material during the height of the season. Such produce is normally not graded, is picked or harvested at different points of growth, and the height of the season may be too short to provide sufficient leg time for handling and processing, not to talk of the quality which is not the same as that required for processing. The perishability aspect of raw materials has also to be considered, since some fruits and vegetables may remain in good condition for weeks, others only for days or indeed only one day in some cases. For processing therefore, efforts have to be made to extend the season of the raw material e.g. by planting methods or utilizing different seeds to obtain early or late crops or by irrigation, glasshouses, or hydroponics which may make it possible to obtain more than one crop per season. In any case, timely picking and proper handling and storage is certainly one essential way to extend the season for the supply of raw materials.

The question of storage and the related activities of handling and transport feature prominently in the cost of raw materials, whether they are undertaken by farmers, wholesalers or co-operatives, or by the processor himself. Storage can be very costly where it involves freezing - substantial capital cost to construct freezing chambers, and current costs in terms of high energy consumption.

To ensure procurement of supplies, it must be assured that growers obtain the necessary credit for agricultural inputs (seeds, fertilizers, pesticides, tools, agro-machinery). This is especially important in view of the seasonability of the produce, where growers cannot expect to be paid before the season is over and their wares are delivered to processors. In the case of most fruit, one must not forget the long time lag between planting of trees and harvesting of the first crops, which may in some cases extend to three of five years or more.

In many developing countries, governments, directly of through agricultural or commercial banks, have established systems of agricultural credit and this is fine if and when it works well - that is when credit meets the full requirements of farmers and it is provided on time, and when the inputs reach the farmer on time. Unfortunately this is not often the case in developing countries when governments are faced with financial, administrative or logistic problems.

The potential investor has therefore to consider these matters carefully, since to ensure procurement, he may have to provide the credit to farmers himself. Where storage and transport are not available or are not well organized at the farm locations, processors may also have to undertake the responsibility. In fact, some processors may prefer to do this in order to ensure a captive supply. The processor, in that case, has to cater for adequate credit facilities for the purpose from his bank, because in his turn, he too does not obtain payment for his products before they are finally delivered to buyers and payment received.

The seasonality of the produce also makes it incumbent on the processor to cater for and obtain a suitable level of working capital to purchase very large quantities of raw materials during the short period they are available, and to draw on the stocks slowly as his production capacity permits. Again, once raw materials are processed into finished goods, the processor must carry large inventories of stocks to be distributed over time to his clients. For, while procurement of raw materials, and to a great extent production, extend over a short period, distribution to market outlets often extends over a

whole year. Hence the requirement of suitable working capital facilities which tend to reach the highest peak during the high season of the crop and to level off slowly as sales are effected. Needless to say, working capital ceilings must be as high as requirements during peak periods. This distinguishes agro-industries from other industries where supplies of inputs and sales are more uniform and closer to each other.

The pricing of raw materials is a crucial financial consideration for processors in an industry where the material content might reach up to 70% or more of the cost of production in some cases. Raw materials may be purchased at spot prices, that is the price prevailing on the market at any given time. This may look reasonable if all competitors adopt the same strategy. But prices tend to vary greatly during a year or across years, thereby causing uncertainity in financial planning. When using spot prices, it would be desireable to buy from as large a number of suppliers as possible in order to achieve the best cost and help control price variablity.

One method of stabilizing the cost of raw materials while also supplies is through purchase contracts with producers. Indeed, this would not only provide a "long-term" price, but would also ensure the supply, since such contracts apart from fixing prices, specifiy quantities, quality standards and delivery dates. However, even in these contracts, the fixing of prices poses problems. Spot prices may be used, but it may be difficult to fix the spot price to be adopted at any given time since this may vary from one selling market to another. Prices may be fixed on a cost-plus basis, that is cost to farmers plus a profit margin. Or, a base price may be paid, plus a bonus derived from the final prices obtained for finished goods. In examining these alternatives, the processor must compare costs versus the certainty of supplies obtained under each. For it is a well know fact that farmers may sell their produce at the best price obtainable anywhere in spite of their being tied by contract. In contracting farmers therefore, it pays to be fair by allowing flexibility if external conditions change.

Many processors endeavour to add strength to the contracts by undertaking to provide credit, agricultural inputs, and/or technical assistance e.g. to improve the yield, thus making it more beneficial to both sides. The value of the contracts ultimately depends on the goodwill of the parties since legal enforcement is often not feasible due to costs and delays in adjudication, and the difficulty in enforcing sentences on producers.

In contracts with farmers, processors may negotiate terms of payment on raw materials, where payment for produce would be made over an extended period rather than in bulk although produce is delivered more or less in bulk. In this way, payment by processor to producer may be staggered in line with receipts from sales. The same goes for other production inputs, especially packaging - plastic or tin containers - since these can be very expensive. The cost of tin cans for canning produce, for example, may be as high as 50% of the ex-factory unit prices. 12/

Another way is for processors to make use of forward contracts where the factory's expected output would be sold in advance at a fixed price expected to cover costs and preserve a margin of profit. A fixed price might be favoured by wholesales or further processors because of its stability which reduces uncertainty to both sellers and buyers. In this case, the risk on end-market price is carried by the buyer rather than the processor. Also, such contracts may be accepted as back-to-back security by banks to provide commensurate overdraft credit facilities. If promissory notes or letters-of-credit are made use of as methods of payment on such contracts, banks normally accept to discount these at a reasonable rate and provide immediate cash less a small discount charge. Operators of cold stores may also consider granting credit facilities to processors to tidy them over during the period between storage of raw materials, processing and receipt of revenues from sales.

12/ C.D. Russerruccion, UNIDO Expert, Feasibility Study on fruit purée in St. Vincent/Grenada (Project DP/STV/76/00, 1980) and T. Abela/M.F. Husny, Feasibility Study on banana purée in Kenya,(Project DP/KEN 80/001, 1983).

Financing of Fixed Capital

The financing of fixed capital requirements for fruit and vegetable processing is normally considered by development finance institutions (DFI's) under their policy of financing agro-industry. Although some DFI's do not discriminate about conditions of financing projects in different economic sectors, most would probably have more favourable conditions for agro-industry in pursuance of Government policies to ensure self-sufficiency in food. Indeed, many developing countries have set up Agricultural Banks to deal specifically with agricultural finance although very often agro-industrial units are served by other DFI's.

The debt-equity ratio adopted by DFI's may vary from 1:2 to 1:4 in different countries. This seems to be quite favourable for investors, were it not for DFI's to insist on tangible collateral to secure medium- or long-term loans, which collateral many would-be local investors are not in a position to provide. In developed countries, bankers may accept to provide 75% to 100% of fixed capital requirements against a charge on company 's assets. In most developing countries, however, bankers may accept to provide only 50% of the forced sale value of machinery. This is a perennial problem in developing countries. Although innovative approaches have sometimes been suggested, such as the setting up of guarantee funds where risks are shared by various banks and insurance companies and where the investor pays a premium to obtain guarantee cover, the problem has defied solution. In such a situation, local investors have no other way but to start small and expand by ploughing back profits, or by having recourse to financing from informal financial circuits (brokers, wholesalers, family or friends) where interest rates are normally much higher than those from formal circuits.

Investor may however investigate other sources for financing of fixed capital equipment, such as direct suppliers' credit, or credit through export credit guarantee organizations of developed countries. The newly industrialized countries also offer relatively good credit arrangements for the supply of equipment, where prices are normally also lower than those offered by developed countries. The question of technology has of course to be looked into, but in the fruit and vegetable sector many technologies are of old standing and well within the capabilities of some developing country suppliers. (This would also enhance technical and economic co-operation among developing countries).

Foreign loans, however, carry with them foreign exchange currency risks since normally they are repaid in hard currencies. Also, problems may be met in developing countries suffering from foreign exchange shortages and the external debt problem, in authorising foreign loans and repayments. Indeed, it is a known fact that in some developing countries some DFI's have obtained foreign lines of credit for onward lending to local entrepreneurs, but the latter are often loath to make use of them because of the foreign exchange risk arising from devaluation of their currency against the currency of the loan. To make matters worse, in some developing countries, losses on foreign exchange are not tax deductable. Governments would do well to study the problem and adopt measures to cushion the effects of foreign exchange risks on entrepreneurs.

Counter-trade arrangements may also be investigated, where suppliers of equipment may accept to be paid in kind, either by buy-back arrangments with the entrepreneur himself, or by obtaining other products in exchange from the country with the assistance of the Government. East European Countries have widely made use of the system as they also experience foreign exchange shortages.

Finally, joint-ventures with foreign partners may be considered. In this case, the foreign partner would provide his share of the equity in cash or in kind (machinery, equipment, raw materials, know-how). Joint-ventures may also provide the necessary technology, top management and technical support and access to markets. Great care must of course be exercised in selecting a partner, where his seriousness and repute deserve better consideration than short-term financial advantages.

With regard to the obtention of technology, it should be borne in mind that many simple technologies or well known technologies may be obtained free of charge in the package for the purchase of equipment, where suppliers of equipment may provide formulae or sources of intermediate inputs to clinch the sale transaction. Obviously, sophisticated technologies which are patented have to be paid for. But also here, it pays entrepreneurs of developing countries to shop around and obtain proposals from various sources before

making a decision since royalties and licence fees may differ greatly between one sources and another. In a study by UNIDO on contractual arrangements in a sample of 198 contracts in the food-processing industry, it was found that royalty rates varied from less than 1% to over 10%. See table No 4.

Royalty rate (%)	Per cent of the sample
less than 1%	7.5
1-2.9%	46.2
3-4.9%	23.8
5-6.9%	17.5
7-9.9%	2.5
10% or more	2.5
	Total 100.0

Source: Trends and issues in contractual arrangements in the food processing sector, J. Cieslik, UNIDO ID/WG.427/11. 1984.

Table No 4

In view of the uncertainty of supplies and prices, many processors may consider integrating forward by having their own "nucleus" of primary production. It has sometimes been suggested that ideally a processing plant should have 50% of the raw material coming from its own plantations, and the rest obtained from various small suppliers preferably on contract basis. It is only very large producers such as TNC's which have the resources to integrate fully forward. Forward integration means however substantial fixed capital requirements which may only be recouped over a very long period of time, and which therefore has to be well catered for in the financial planning of the project. Having one's own plantation also carries risks originating from plant deseases, droughts etc which are then shifted from producers to producer-processors.

Since costs of storage, transport and packaging are incommensurately high with regard to ex-factory prices, and since they make considerable demands on working capital requirements, processors may consider integrating backwards by constructing their own cold stores, buying a transport fleet, and perhaps incorporating a can-making plant. This would tend to limit costs and reduce working capital requirements and dependance on outside forces, but it means investing considerably more in fixed capital instead. Comparison of costs, and added management responsibilities, have to be studied carefully before processors decide to invest in these areas.

Apart from forward and backward integration as mentioned above, processors may also consider investing somewhat more in capital equipment to be able to process different products as they come on season throughout the year, bearing in mind that fruits and vegetables have different harvesting seasons. That is extending their processing unit into a multi-purpose factory. Multi-purposeness enhances the viability of the project as it makes possible the better rational and optimal use of the same equipment and increases the return on invested capital by obtaining more production and sales and cutting down idle time in what would otherwise be off-season periods.

In most processing units, most of the plant can be said to be multi-purpose as the processing activity is the same for different raw materials e.g. washing, sizing evaporating, dehydrating, vacuum sealing, canning, drying, sterilizating, and use of conveyors. To deal with different raw materials often only some additional controls (e.g. variable speed motors, temperature controls, flow controls, etc.) or additional tools (screens in finishers, knives in cutters etc.) may be required. But this should not increase the cost of equipment by a very substantial margin. Some specialized equipment may however be required additionally for only one fruit or vegetable.

In planning multi-purpose plants, the feasibility, or at least the break-even point, of the project should be based on the "principal" raw material to be processed, and all fixed costs should be charged to this production. The processing of "complementary" products should then be evaluated on the basis of their contribution to the additional profitability of the plant operations, where only the variable costs and additional fixed

cost would be considered, in computing the overall profit and loss account of the firm. It is of interest to note that with good planning, a processing unit may be started as a single-purpose plant, and gradually expanded into a multi-purpose one with the introduction of additional controls, tools and specialized equipment. This may make sense in view of difficulties in securing adequate credit for financing fixed capital equipment in developing countries. 13/

13/ See Small-medium multipurpose fruit and vegetable processing plants, Jehuda Orshan, UNIDO/IS/INQ4, 1985.

VII. CONSTRAINTS AND SOME REMEDIAL MEASURES 14/

It is generally agreed that processing of commodities offers improved prospects for substantially higher export earnings as compared to exports of such commodities in their unprocessed forms. However, processing is not always economically viable and is clearly dependent upon the cost of production, including the cost and availability of intermediate inputs (materials) and supporting services (infrastruture).

The involvement of developing countries in fruit and vegetable processing is basically in the intermediate processing stage. The production of final products is concentrated in developed countries, where producers have acquired, over tim a sophisticated knowledge of consumer behaviour, adjusting their product range and quality to market requirements and prevailing standards and tastes. There is intense competition among such producers in defence of their market shares, which poses considerable difficulties for new entrants to the markets. A striking example of this is the market for orange juice. About 90 per cent of world exports of orange juice originate from Brazil, but the bulk is sold under the brand names of well-established and well-know transnational corporations domiciled outside Brazil. In the developing countries themselves, transnational corporations also frequently hold a dominant position, whether in respect of the semi-processed or fully processed goods.

Frequently, the proportions of different raw material inputs used to produce a final product are influenced by the desire of the firm to differentiate its product from that of its competitors. Producers with processing facilities located in or close to principal consumer markets are clearly better able to react quickly to changes in market conditions than producers in developing countries, who have only a limited influence on the world market for final goods and limited knowledge of changes therein. Given the growing importance of developing countries as markets for agro-industrial products, regional and interregional co-operation among developing countries

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14/ See Protection and Structural Adjustment, problems of agro-industrial production and trade, UNCTAD, 1985, pp. 10-16, 19-23.

could contribute to increasing local processing based on their own raw materials, up to the stage of final products. The resulting economies of scale would be likely to improve their competitive position internationally and the experience gained might facilitate their entry into developed country markets in the longer term

The prevailing competition, including at trade fairs, among suppliers of capital goods needed for the processing industries suggests that such equipment is readily available. In addition, advice on the choice of established technology is normally available from consulting engineering services, including its provision on a turnkey basis. Thus, while normally the purchase of the equipment necessary for processing faces few constraints, if balance of payments considerations are excluded, the obtention of the technical know-how may be subject to restrictions imposed by the licensor. To the extent that the application of new and emerging technologies becomes important in the production of final products, the issue of processing and patent rights thus arises. In such cases, developing countries may encunter technology access problems; for example, the suppliers may insist on a joint venture or may only be willing to supply the technology subject to certain restrictions, including restrictions on exports of the processed products.

Incomplete, inaccurate and biased information, including that form consulting engineering firms, has often led to the purchase of equipment not fully adequate for the purpose envisaged. A related important consideration is the availability of spare parts at reasonable prices. Because of intense competition, suppliers of processing equipment often seek to obtain an order by quoting unduly low prices, on the assumption that profits can be recouped through high prices for spare parts and maintenance since the buyer is tied to the original supplier.

In the case of the establishment of sophisticated production there may be problems of the availability of skilled labour and of capital. Foreign technical and managerial staff may be required to operate plants during a long initial period. The training of an indigenous work force is imperative if production costs are to be optimized. The need for highly skilled labour contrasts with the situation in current processing activities in developing countries, where the major demand is for semi-skilled labour.

Capital requirements can in certain instances be an important constraint, especially for developing countries with balance-of-payments difficulties. Access to international financing is then essential in terms of either foreign loans to domestic companies or of joint-ventures with a foreign company. Another option may be counter-trade arrangements, providing for repayment of the costs involved in purchasing the necessary equipment and technology by the export of the resultant processed product during a specified period. Such arrangements immediately establish the processing industry on an export-oriented basis and overcome the marketing problems since the supplier of the equpment and technology assumes the marketing function.

Investment decisions enabling increased processing of fruit and vegetables in developing countries are influenced by the economic and political climate. Political stability, which is frenquently mentioned, appears to be of less importance than the existence of an intact infrastructure in terms both of physical facilities and of policies consistent with the achievement of the sought objective, for example through the provision of investment incentives. In this regard, it has to be borne in mind that virtually all developed countries provide incentives for processing in their countries, which frequently are intended to attract processing industries to backward areas and to support restructuring in traditional industries. Examples of such incentives are the provision of land free of charge for the establishment of factories, the provision of buildings at nominal rates, tax holidays, wage and salary subsidies, interest subsidies and guanrantees, and low-priced energy supplies and subsidies on exports.

While a developing country wishing to attract companies to establish processing facilities must be able to offer incentives comparable to those offered in developed countries, it must also be able to meet those being offered in other developing countries. The ability of a developing country to provide incentives clearly depends upon the availability of budget revenues, and the legal and institutional set-up to grant incentives.

In addition to underlying economic factors affecting world supply and demand for agro-industrial products, policies pursued by governments of importing countries have a major impact on import demand. A variety of

measures are used by governements to restrict imports of agro-industrial products. They range from conventional tariffs to a complex array of non-tariff measures (including, for example, variable import levies, other charges and internal taxes, minimum import prices, licensing, outright prohibitions and quantitative restrictions as well as "voluntary" export restraint arrangements, health regulations and other technical standards).

A major feature of the structure of tariffs and non-tariff measures affecting agricultural products in all markets is the general tendency for tariffs to escalate with the stage of processing, and for non-tariff measures to weigh more heavily on the more processed forms of commodities. Very often no tariff or non-tariff measure is applied against imports of a commodity in raw form, but once some processing is undertaken, these barriers rise rapidly. The basic effect of trade barrier escalation on internatinonal trade in processed products is to reduce world import demand for such products, in particular form developing countries. Tariff and non-tariff measures tend to cut back imports of processed products by reducing demand or switching it from imports to domestically processed products and or by encouraging substitute production (i.e., the processing activity) in the importing country.

The strategy of TNCs has frequently been to install or license capacities on the basis of the perceived needs of the local market. In consequence, there is, in effect, a restriction - explicit or implicit - on export. The problem hence becomes how to induce the TNC to permit expansion of production for export. Various methods have been tried, including the setting of export requirements and making imports dependent on exports. An alternative strategy of a TNC may be to process a particular raw material up to a certain stage and for the whole or most of the resulting output to be exported to the parent and other affiliates for transformation into a whole range of final products. The problem in this instance is how to induce the TNC to undertake production of more finished products through its subsidiary in the developing country.

The socialist countries of Eastern Europe have also assisted in the expansion of agro-industrial capacities of the developing countries. The long-term credits accorded by the socialist countries for particular projects are usually repaid in traditional exports as well as by locally produced semi-manufactured and finished goods. A certain percentage of local products is delivered in exchange for technical assistance. In many cases credits are

repaid within the framework of buy-back agreements. Taking into account the hard currency shortages on both sides, arrangements for the mutual exchange of specific goods including barter-type deals are widespread, sometimes including deliveries of raw materials to developing countries. Long-term supply contracts for raw and processed commodities are also widely used, and in certain cases deliveries from developing countries receive preferential tariff treatment. Many processed goods from these countries are in high demand in the socialist countries of Eastern Europe, and to promote access for them to their market, some of those countries have started to introduce special clauses in their agreements with developing countries.

Oligopolistic market structures are frequent and are a direct result of high product differentiation built up and maintained through a variety of means, such as trademarks and brand loyalty, with substantial expenditure on advertising and other publicity. Most developing countries have acquired expertise in either the private or the public sector for export sales of their commodities in raw form and have ready access to the necessary marketing information. However, they have much more limited expertise and information with respect to the marketing of processed products.

Countries usually try to develop their marketing outlets through the use of foreign trade representatives, providing focal points for information and contacts, through the dispatch of trade missions to specific countries in order to determine the market requirements and develop direct contacts, and through participation in various trade fairs, especially those in developed countries. Some have also relied on international trading firms to do their marketing for them. In all cases it has clearly been difficult and expensive for processing firms in developing countries to attain the requisite level of competence and acquire the networks of contacts and information needed for supporting their export of processed products. This is one area in which the needs of developing countries are most pressing.

A further complication in the processing and marketing of fruit and vegetable products is the need to produce products which respond to consumer tastes, which vary over markets and over time. This in turn requires quality controls at the production end and knowledge of the consumer tastes, packaging

requirements, etc., in the markets being served. Guarantees of quality are virtually a pre-requisite for the marketing and distribution abroad of any processed products, particularly in view of the laws on product liability. Hence, certification of quality and fulfilment of packaging and labelling requirements of the importing country concern all exporters. Such requirements, however, vary from one country to another, which in itself poses problems for manufacturers, and when the norms set in one country are particularly difficult to meet or higher than those generally required in other countries, they can become an effective barrier to entry.

An important consideration in the marketing and distribution of food products is the growth of retail supermarkets, in developing countries also, and hence the increasing emphasis on the sale of stardartized products of a specified quality. The importance of supermarkets in developed countries has already led to the claim that through their power as purchasers in bulk, they have been able to force down the profit margins not only of their major domestic suppliers but also of their foreign suppliers.

In the area of distribution, problems arise for developing countries in the transport and storage of their agro-industrial products. Shipping of processed products is often carried out in quite different ways than that of the raw material, with the use of different packaging and handling methods. Transportation costs sometimes inevitably account for a high proportion of the c.i.f. value of the shipment and hence heavily influence the ability to export. Other problems frequently mentioned by developing country firms include those connected with being able to respond quickly to potential orders; the small shipment to varying destinations; the need to co-ordinate shipments among firms in order to economize in shipping costs; apparent freight rate discrimination against processed products or between supplying regions often arising from non-transparent methods of setting freight rates; infrequent port calls and difficulties in arranging direct transport to certain markets.

The issue of storage arises basically in two ways; first, the adequacy of storage facilities at the processing end for the raw and finished products, especially for products susceptible to spoilage and other forms of

deterioration; and second, the need for adequate warehousing in consumer markets for finished products in order to be able to respond to customer demands with minimum delays. While a few countries, have purchased or rented warehousing facilities in their major market areas, others have been reluctant to do so because of the costs involved, the lack of assured market access, and absence of necessary expertise.